Appendix A

Sampling and Analysis Plan Tables

Plan Table Number: LTS ECM 2003

DRAFT

SAP Number

Date: 01/28/2003 Plan Table Revision: 0.0 Project: LONG-TERM ECOLOGICAL MONITORING FY-03 Project Manager: HANEY, T J./VANHORN, R. L. SMO Contact: MCGRIFF, T. W.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	3Q	N7	RH	3S	LA														
ECR001	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	REFERENCE AREA	NA			1	1		1														
ECR002	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	REFERENCE AREA	NA			1	1		1														
ECR003	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	REFERENCE AREA	NA			1	1		1														
ECR004	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	REFERENCE AREA	NA			1	1		1														
ECR005	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	REFERENCE AREA	NA			1	1		1														
ECR006	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	REFERENCE AREA	NA			1	1		1														
ECR007	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	REFERENCE AREA	NA			1	1		1														
ECR008	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	REFERENCE AREA	NA			1	1		1														
ECR009	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	REFERENCE AREA	NA			1	1		1														
ECR010	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	REFERENCE AREA	NA			1	1		1														
ECR011	REG/QC	PLANT BIOTA	DUP	COMP	05/01/03	INEEL	SAGEBRUSH	REFERENCE AREA	NA			2	2		2														
ECR012	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	REFERENCE AREA	NA			1	1		1														
ECR013	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	REFERENCE AREA	NA			1	1		1														
ECR014	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	REFERENCE AREA	NA			1	1		1														
ECR015	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	REFERENCE AREA	NA			1	1		1														

The sampling activity displayed on this table represents the first six characters of the sample identification number. The complete sample identification number (10 characters) will appear on field guidance forms and sample labels.

AT1: Analysis Suite #1
AT2: Earthworm Toxicity Test
AT3: Nitroaromatics (8330)
AT4: Radiochemistry - Suite 1
AT5: Rye Grass Growth Test
AT6: Total Metals (TAL)
AT7:
AT8:
AT9:
AT10:

AT11:
AT12:
AT13:
AT14:
AT15:
AT16:
AT17:
AT18:
AT19:
AT20:

Comments:
Earthworm Toxicity Test by ASTM standard E1676-97
Rye Grass Test by ASTM standard E-1598-94 Seedling Growth Test
The TAL for gamma spec shall include standard list plus K-40
Nitroaromatics TAL shall include TNT, RDX, HMX, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene
Total Metals (TAL) shall include arsenic, beryllium, cadmium, chromium, lead, mercury, zinc by SW-846 method 6010B

Analysis Suites:
Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity
Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Contingencies:

Plan Table Number: LTS ECM 2003

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SAP Number:

Date: 01/28/2003 Plan Table Revision: 0.0 Project: LONG-TERM ECOLOGICAL MONITORING FY-03 Project Manager: HANEY, T. J./VANHORN, R. L. SMO Contact: MCGRIFF, T. W.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
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Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	3Q	N7	RH	3S	LA														
ECR016	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	REFERENCE AREA	NA			1	1		1														
ECR017	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	REFERENCE AREA	NA			1	1		1														
ECR018	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	REFERENCE AREA	NA			1	1		1														
ECR019	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	REFERENCE AREA	NA			1	1		1														
ECR020	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	REFERENCE AREA	NA			1	1		1														
ECR021	REG/QC	PLANT BIOTA	DUP	COMP	05/01/03	INEEL	CRESTED WHEATGR	REFERENCE AREA	NA			2	2		2														
ECR022	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	REFERENCE AREA	NA			1	1		1														
ECR023	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	REFERENCE AREA	NA			1	1		1														
ECR024	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	REFERENCE AREA	NA			1	1		1														
ECR025	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	REFERENCE AREA	NA			1	1		1														
ECR026	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	REFERENCE AREA	NA			1	1		1														
ECR027	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	REFERENCE AREA	NA			1	1		1														
ECR028	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	REFERENCE AREA	NA			1	1		1														
ECR029	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	REFERENCE AREA	NA			1	1		1														
ECR030	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	REFERENCE AREA	NA			1	1		1														

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AT6: Total Metals (TAL)
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Comments:
Earthworm Toxicity Test by ASTM standard E1676-97

Rye Grass Test by ASTM standard E-1598-94 Seedling Growth Test

The TAL for gamma spec shall include standard list plus K-40

Nitroaromatics TAL shall include TNT, RDX, HMX, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-amino-4,6-dinitrotoluene, 4-amino,2,6-dinitrotoluene

Total Metals (TAL) shall include arsenic, beryllium, cadmium, chromium, lead, mercury, zinc by SW-846 method 6010B

Analysis Suites:
Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cabon Exchange Capacity
Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Contingencies:

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Date: 01/28/2003 Plan Table Revision: 0.0 Project: LONG-TERM ECOLOGICAL MONITORING FY-03 Project Manager: HANEY, T. J./VANHORN, R. L. SMO Contact: MCGRIFF, T. W.

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Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1 3A	AT2 3Q	AT3 N7	AT4 RH	AT5 3S	AT6 LA	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
ECR031	REG/QC	SOIL	DUP	COMP	05/01/03	INEEL	SURFACE SOILS	REFERENCE AREA	NA	2		2	2		2														
ECR032	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	REFERENCE AREA	NA	1		1	1		1														
ECR033	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	REFERENCE AREA	NA	1		1	1		1														
ECR034	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	REFERENCE AREA	NA	1		1	1		1														
ECR035	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	REFERENCE AREA	NA	1		1	1		1														
ECR036	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	REFERENCE AREA	NA	1		1	1		1														
ECR037	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	REFERENCE AREA	NA	1		1	1		1														
ECR038	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	REFERENCE AREA	NA	1		1	1		1														
ECR039	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	REFERENCE AREA	NA	1		1	1		1														
ECR040	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	REFERENCE AREA	NA	1		1	1		1														
ECR041	REG/QC	SOIL	DUP	COMP	05/01/03	INEEL	SUBSURFACE SOIL	REFERENCE AREA	TBD	2		2	2		2														
ECR042	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	REFERENCE AREA	TBD	1		1	1		1														
ECR043	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	REFERENCE AREA	TBD	1		1	1		1														
ECR044	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	REFERENCE AREA	TBD	1		1	1		1														
ECR045	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	REFERENCE AREA	TBD	1		1	1		1														

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AT11:
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Comments:
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Analysis Suites:
Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity
Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Contingencies:

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											AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	3Q	N7	RH	3S	LA														
ECR046	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	REFERENCE AREA	TBD	1		1	1		1														
ECR047	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	REFERENCE AREA	TBD	1		1	1		1														
ECR048	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	REFERENCE AREA	TBD	1		1	1		1														
ECR049	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	REFERENCE AREA	TBD	1		1	1		1														
ECR050	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	REFERENCE AREA	TBD	1		1	1		1														
ECR051	REG/QC	SOIL	DUP	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	2				2															
ECR052	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1				1															
ECR053	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1				1															
ECR054	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1				1															
ECR055	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1				1															
ECR056	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1				1															
ECR057	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1				1															
ECR058	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1				1															
ECR059	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1				1															
ECR060	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1				1															

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Comments:
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Analysis Suites:
Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity
Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Contingencies:

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										3A	3Q	N7	RH	3S	LA														
ECR051	REG/QC	SOIL	DUP	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	2	2																		
ECR052	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1	1																		
ECR053	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1	1																		
ECR054	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1	1																		
ECR055	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1	1																		
ECR056	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1	1																		
ECR057	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1	1																		
ECR058	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1	1																		
ECR059	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1	1																		
ECR070	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	REFERENCE AREA	TBD	1	1																		
ECT001	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	TRA	NA				1		1														
ECT002	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	TRA	NA				1		1														
ECT003	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	TRA	NA				1		1														
ECT004	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	TRA	NA				1		1														
ECT005	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	TRA	NA				1		1														

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Comments:

Earthworm Toxicity Test by ASTM standard E1676-97

Rye Grass Test by ASTM standard E-1598-94 Seedling Growth Test

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Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity
Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

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ECT006	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	TRA	NA				1		1														
ECT007	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	TRA	NA				1		1														
ECT008	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	TRA	NA				1		1														
ECT009	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	TRA	NA				1		1														
ECT010	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	TRA	NA				1		1														
ECT011	REG/QC	PLANT BIOTA	DUP	COMP	05/01/03	INEEL	SAGEBRUSH	TRA	NA				2		2														
ECT012	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	TRA	NA				1		1														
ECT013	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	TRA	NA				1		1														
ECT014	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	TRA	NA				1		1														
ECT015	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	TRA	NA				1		1														
ECT016	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	TRA	NA				1		1														
ECT017	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	TRA	NA				1		1														
ECT018	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	TRA	NA				1		1														
ECT019	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	TRA	NA				1		1														
ECT020	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	TRA	NA				1		1														

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Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Contingencies:

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Date: 01/28/2003 Plan Table Revision: 0.0 Project: LONG-TERM ECOLOGICAL MONITORING FY-03 Project Manager: HANEY, T. J./VANHORN, R. L. SMO Contact: MCGRIFF, T. W.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1 3A	AT2 3Q	AT3 N7	AT4 RH	AT5 3S	AT6 LA	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
ECT021	REG/QC	PLANT BIOTA	DUP	COMP	05/01/03	INEEL	CRESTED WHEATGR	TRA	NA				2		2														
ECT022	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	TRA	NA				1		1														
ECT023	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	TRA	NA				1		1														
ECT024	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	TRA	NA				1		1														
ECT025	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	TRA	NA				1		1														
ECT026	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	TRA	NA				1		1														
ECT027	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	TRA	NA				1		1														
ECT028	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	TRA	NA				1		1														
ECT029	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	TRA	NA				1		1														
ECT030	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	TRA	NA				1		1														
ECT031	REG/QC	SOIL	DUP	COMP	05/01/03	INEEL	SURFACE SOIL	TRA	NA	2			2		2														
ECT032	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOIL	TRA	NA	1			1		1														
ECT033	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOIL	TRA	NA	1			1		1														
ECT034	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOIL	TRA	NA	1			1		1														
ECT035	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOIL	TRA	NA	1			1		1														

The sampling activity displayed on this table represents the first six characters of the sample identification number. The complete sample identification number (10 characters) will appear on field guidance forms and sample labels.

AT1: Analysis Suite #1
AT2: Earthworm Toxicity Test
AT3: Nitroaromatics (8330)
AT4: Radiochemistry - Suite 1
AT5: Rye Grass Growth Test
AT6: Total Metals (TAL)
AT7:
AT8:
AT9:
AT10:

AT11:
AT12:
AT13:
AT14:
AT15:
AT16:
AT17:
AT18:
AT19:
AT20:

Comments:

Earthworm Toxicity Test by ASTM standard E1676-97

Rye Grass Test by ASTM standard E-1598-94 Seedling Growth Test

The TAL for gamma spec shall include standard list plus K-40

Nitroaromatics TAL shall include TNT, RDX, HMX, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-amino-4,6-dinitrotoluene, 4-amino,2,6-dinitrotoluene

Total Metals (TAL) shall include arsenic, beryllium, cadmium, chromium, lead, mercury, zinc by SW-846 method 6010B

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-iso, U-iso, Sr-90

Contingencies:

Plan Table Number: LTS ECM 2003

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SAP Number:

Date: 01/28/2003 Plan Table Revision: 0.0 Project: LONG-TERM ECOLOGICAL MONITORING FY-03 Project Manager: HANEY, T. J./VANHORN, R. L. SMO Contact: MCGRIFF, T. W.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										3A	3Q	N7	RH	3S	LA														
ECT036	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOIL	TRA	NA	1			1		1														
ECT037	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOIL	TRA	NA	1			1		1														
ECT038	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOIL	TRA	NA	1			1		1														
ECT039	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOIL	TRA	NA	1			1		1														
ECT040	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOIL	TRA	NA	1			1		1														
ECT041	REG/QC	SOIL	DUP	COMP	05/01/03	INEEL	SUBSURFACE SOIL	TRA	TBD	2			2		2														
ECT042	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	TRA	TBD	1			1		1														
ECT043	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	TRA	TBD	1			1		1														
ECT044	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	TRA	TBD	1			1		1														
ECT045	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	TRA	TBD	1			1		1														
ECT046	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	TRA	TBD	1			1		1														
ECT047	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	TRA	TBD	1			1		1														
ECT048	REG	SOIL	GRAB	COMP	06/01/03	INEEL	SUBSURFACE SOIL	TRA	TBD	1			1		1														
ECT049	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	TRA	TBD	1			1		1														
ECT050	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	TRA	TBD	1			1		1														

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AT8:
AT9:
AT10:
AT11:
AT12:
AT13:
AT14:
AT15:
AT16:
AT17:
AT18:
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AT20:

Comments:
Earthworm Toxicity Test by ASTM standard E1676-97
Rye Grass Test by ASTM standard E-1598-94 Seedling Growth Test
The TAL for gamma spec shall include standard list plus K-40
Nitroaromatics TAL shall include TNT, RDX, HMX, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-amino-4,6-dinitrotoluene, 4-amino,2,6-dinitrotoluene
Total Metals (TAL) shall include arsenic, beryllium, cadmium, chromium, lead, mercury, zinc by SW-846 method 6010B

Analysis Suites:
Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity
Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Contingencies:

Plan Table Number: LTS ECM 2003

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Date: 01/28/2003 Plan Table Revision: 0.0 Project: LONG-TERM ECOLOGICAL MONITORING FY-03 Project Manager: HANEY, T. J./VANHORN, R. L. SMO Contact: MCGRIFF, T. W.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
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										3A	3Q	N7	RH	3S	LA														
ECT051	REG/QC	SOIL	DUP	COMP	05/01/03	INEEL	SOIL	TRA	TBD	2				2															
ECT052	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1				1															
ECT053	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1				1															
ECT054	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1				1															
ECT055	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1				1															
ECT056	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1				1															
ECT057	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1				1															
ECT058	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1				1															
ECT059	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1				1															
ECT060	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1				1															
ECT061	REG/QC	SOIL	DUP	COMP	05/01/03	INEEL	SOIL	TRA	TBD	2	2																		
ECT062	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1	1																		
ECT063	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1	1																		
ECT064	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1	1																		
ECT065	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1	1																		

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AT9:
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AT11:
AT12:
AT13:
AT14:
AT15:
AT16:
AT17:
AT18:
AT19:
AT20:

Comments:

Earthworm Toxicity Test by ASTM standard E1676-97

Rye Grass Test by ASTM standard E-1598-94 Seedling Growth Test

The TAL for gamma spec shall include standard list plus K-40

Nitroaromatics TAL shall include TNT, RDX, HMX, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-amino-4,6-dinitrotoluene, 4-amino,2,6-dinitrotoluene

Total Metals (TAL) shall include arsenic, beryllium, cadmium, chromium, lead, mercury, zinc by SW-846 method 6010B

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity
Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-iso, U-iso, Sr-90

Contingencies:

Plan Table Number: LTS ECM 2003

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Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	AT1 3A	AT2 3Q	AT3 N7	AT4 RH	AT5 3S	AT6 LA	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
ECT066	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1	1																		
ECT067	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1	1																		
ECT068	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1	1																		
ECT069	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1	1																		
ECT070	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	TRA	TBD	1	1																		
ECX001	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	ORDNANCE AREA	NA			1	1		1														
ECX002	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	ORDNANCE AREA	NA			1	1		1														
ECX003	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	ORDNANCE AREA	NA			1	1		1														
ECX004	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	ORDNANCE AREA	NA			1	1		1														
ECX005	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	ORDNANCE AREA	NA			1	1		1														
ECX006	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	ORDNANCE AREA	NA			1	1		1														
ECX007	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	ORDNANCE AREA	NA			1	1		1														
ECX008	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	ORDNANCE AREA	NA			1	1		1														
ECX009	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	ORDNANCE AREA	NA			1	1		1														
ECX010	REG	ANIMAL BIOTA	GRAB	COMP	05/01/03	INEEL	DEER MOUSE	ORDNANCE AREA	NA			1	1		1														

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AT1: Analysis Suite #1
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AT14:
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AT16:
AT17:
AT18:
AT19:
AT20:

Comments:

Earthworm Toxicity Test by ASTM standard E1676-97

Rye Grass Test by ASTM standard E-1598-94 Seedling Growth Test

The TAL for gamma spec shall include standard list plus K-40

Nitroaromatics TAL shall include TNT, RDX, HMX, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-amino-4,6-dinitrotoluene, 4-amino,2,6-dinitrotoluene

Total Metals (TAL) shall include arsenic, beryllium, cadmium, chromium, lead, mercury, zinc by SW-846 method 6010B

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Contingencies:

Plan Table Number: LTS ECM 2003

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Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										3A	3Q	N7	RH	3S	LA														
ECX011	REG/QC	PLANT BIOTA	DUP	COMP	05/01/03	INEEL	SAGEBRUSH	ORDNANCE AREA	NA			2	2		2														
ECX012	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	ORDNANCE AREA	NA			1	1		1														
ECX013	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	ORDNANCE AREA	NA			1	1		1														
ECX014	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	ORDNANCE AREA	NA			1	1		1														
ECX015	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	ORDNANCE AREA	NA			1	1		1														
ECX016	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	ORDNANCE AREA	NA			1	1		1														
ECX017	REG	PLANT BIOTA	GRAB	COMP	06/01/03	INEEL	SAGEBRUSH	ORDNANCE AREA	NA			1	1		1														
ECX018	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	ORDNANCE AREA	NA			1	1		1														
ECX019	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	ORDNANCE AREA	NA			1	1		1														
ECX020	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	SAGEBRUSH	ORDNANCE AREA	NA			1	1		1														
ECX021	REG/QC	PLANT BIOTA	DUP	COMP	05/01/03	INEEL	CRESTED WHEATGR	ORDNANCE AREA	NA			2	2		2														
ECX022	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	ORDNANCE AREA	NA			1	1		1														
ECX023	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	ORDNANCE AREA	NA			1	1		1														
ECX024	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	ORDNANCE AREA	NA			1	1		1														
ECX025	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	ORDNANCE AREA	NA			1	1		1														

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Comments:
Earthworm Toxicity Test by ASTM standard E1676-97
Rye Grass Test by ASTM standard E-1598-94 Seedling Growth Test
The TAL for gamma spec shall include standard list plus K-40
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Analysis Suites:
Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity
Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Contingencies:

Plan Table Number: LTS ECM 2003

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Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	3O	N7	RH	3S	LA														
ECX026	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	ORDNANCE AREA	NA			1	1		1														
ECX027	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	ORDNANCE AREA	NA			1	1		1														
ECX028	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	ORDNANCE AREA	NA			1	1		1														
ECX029	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	ORDNANCE AREA	NA			1	1		1														
ECX030	REG	PLANT BIOTA	GRAB	COMP	05/01/03	INEEL	CRESTED WHEATGR	ORDNANCE AREA	NA			1	1		1														
ECX031	REG/QC	SOIL	DUP	COMP	05/01/03	INEEL	SURFACE SOILS	ORDNANCE AREA	NA	2		2	2		2														
ECX032	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	ORDNANCE AREA	NA	1		1	1		1														
ECX033	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	ORDNANCE AREA	NA	1		1	1		1														
ECX034	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	ORDNANCE AREA	NA	1		1	1		1														
ECX035	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	ORDNANCE AREA	NA	1		1	1		1														
ECX036	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	ORDNANCE AREA	NA	1		1	1		1														
ECX037	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	ORDNANCE AREA	NA	1		1	1		1														
ECX038	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	ORDNANCE AREA	NA	1		1	1		1														
ECX039	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	ORDNANCE AREA	NA	1		1	1		1														
ECX040	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SURFACE SOILS	ORDNANCE AREA	NA	1		1	1		1														

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Comments

Earthworm Toxicity Test by ASTM standard E1676-97

Rye Grass Test by ASTM standard E-1598-94 Seedling Growth Test

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Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Contingencies

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										3A	3Q	N7	RH	3S	LA														
ECX041	REG/QC	SOIL	DUP	COMP	05/01/03	INEEL	SUBSURFACE SOIL	ORDNANCE AREA	TBD	2		2	2		2														
ECX042	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	ORDNANCE AREA	TBD	1		1	1		1														
ECX043	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	ORDNANCE AREA	TBD	1		1	1		1														
ECX044	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	ORDNANCE AREA	TBD	1		1	1		1														
ECX045	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	ORDNANCE AREA	TBD	1		1	1		1														
ECX046	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	ORDNANCE AREA	TBD	1		1	1		1														
ECX047	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	ORDNANCE AREA	TBD	1		1	1		1														
ECX048	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	ORDNANCE AREA	TBD	1		1	1		1														
ECX049	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	ORDNANCE AREA	TBD	1		1	1		1														
ECX050	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SUBSURFACE SOIL	ORDNANCE AREA	TBD	1		1	1		1														
ECX051	REG/QC	SOIL	DUP	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	2				2															
ECX052	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1				1															
ECX053	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1				1															
ECX054	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1				1															
ECX055	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1				1															

The sampling activity displayed on this table represents the first six characters of the sample identification number. The complete sample identification number (10 characters) will appear on field guidance forms and sample labels.

AT1: Analysis Suite #1
AT2: Earthworm Toxicity Test
AT3: Nitroaromatics (8330)
AT4: Radiochemistry - Suite 1
AT5: Rye Grass Growth Test
AT6: Total Metals (TAL)
AT7:
AT8:
AT9:
AT10:
AT11:
AT12:
AT13:
AT14:
AT15:
AT16:
AT17:
AT18:
AT19:
AT20:

Comments:
Earthworm Toxicity Test by ASTM standard E1676-97
Rye Grass Test by ASTM standard E-1598-94 Seedling Growth Test
The TAL for gamma spec shall include standard list plus K-40
Nitroaromatics TAL shall include TNT, RDX, HMX, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-amino-4,6-dinitrotoluene, 4-amino,2,6-dinitrotoluene
Total Metals (TAL) shall include arsenic, beryllium, cadmium, chromium, lead, mercury, zinc by SW-846 method 6010B

Analysis Suites:
Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity
Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Contingencies:

Plan Table Number. LTS ECM 2003

DRAFT

SAP Number:

Date: 01/28/2003 Plan Table Revision: 0.0 Project: LONG-TERM ECOLOGICAL MONITORING FY-03 Project Manager. HANEY, T. J./VANHORN, R. L. SMO Contact. MCGRIFF, T. W.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										3A	3Q	N7	RH	3S	LA														
ECX056	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1				1															
ECX057	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1				1															
ECX058	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1				1															
ECX059	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1				1															
ECX060	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1				1															
ECX061	REG/QC	SOIL	DUP	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	2	2																		
ECX062	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1	1																		
ECX063	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1	1																		
ECX064	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1	1																		
ECX065	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1	1																		
ECX066	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1	1																		
ECX067	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1	1																		
ECX068	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1	1																		
ECX069	REG	SOIL	GRAB	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1	1																		
ECX070	REG	SOIL	DUP	COMP	05/01/03	INEEL	SOIL	ORDNANCE AREA	TBD	1	1																		

The sampling activity displayed on this table represents the first six characters of the sample identification number. The complete sample identification number (10 characters) will appear on field guidance forms and sample labels.

AT1: Analysis Suite #1
AT2: Earthworm Toxicity Test
AT3: Nitroaromatics (8330)
AT4: Radiochemistry - Suite 1
AT5: Rye Grass Growth Test
AT6: Total Metals (TAL)
AT7:
AT8:
AT9:
AT10:

AT11:
AT12:
AT13:
AT14:
AT15:
AT16:
AT17:
AT18:
AT19:
AT20:

Comments:

Earthworm Toxicity Test by ASTM standard E1676-97

Rye Grass Test by ASTM standard E-1598-94 Seedling Growth Test

The TAL for gamma spec shall include standard list plus K-40

Nitroaromatics TAL shall include TNT, RDX, HMX, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-amino-4,6-dinitrotoluene, 4-amino,2,6-dinitrotoluene

Total Metals (TAL) shall include arsenic, beryllium, cadmium, chromium, lead, mercury, zinc by SW-846 method 6010B

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Contingencies:

Appendix B

Sample Collection Procedures

Appendix B

Sample Collection Procedures

B1. OVERVIEW

Sampling for LTEM occurs as presented in the LTEM Plan (DOE-ID 2002b). Efforts are directed at sampling to determine levels of contamination in the selected media and to detect possible effects. Levels of contamination in soil, deer mice, and plants are determined to validate the OU 10-04 ERA assumption of no migration of contamination off the AOCs and to establish a baseline. Effects data are evaluated for soil fauna, plants, mammals, and avian receptors at the AOCs. This appendix presents the sampling procedures used to collect analytical and effects samples at each AOC. The efforts include:

1. Perform field plot selection for each of the three areas by randomly selecting ten plots in the site location grids (i.e., TRA, Ordnance Area #1, and reference areas) designated for FY 2003 sampling

2. Prepare the plots by staking the corners and center, and distributing mammal traps in 3 m (10 ft) intervals on the 100 × 100 m (110 × 110 yd) plot as shown in Figure B-1 and discussed in TPR-145

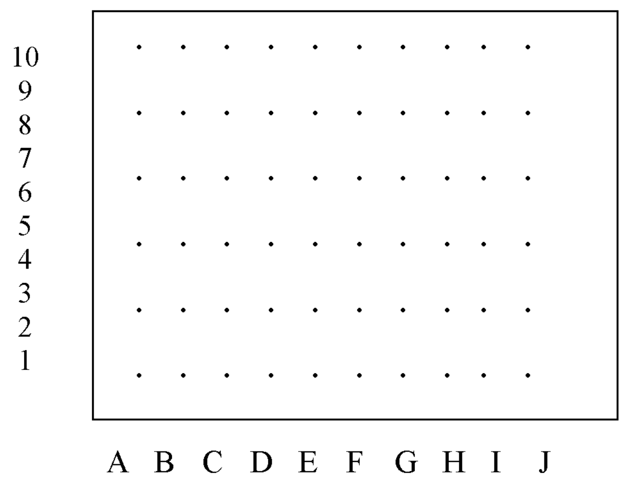

Figure B-1. Example of the transect design.

3. Obtain necessary paperwork, including safe work permits, scientific/trapping collection permits, and radiological work permits

4. Obtain all sampling equipment, forms, labels, etc. as required

5. Perform sampling in the spring and early summer of 2003:

    a. During the first week:

        (1) Perform soil sampling for plant and earthworm bioassays, analytical concentrations, and soil fauna community structure determination with the Berlese Funnel extraction procedure (the sampling procedure is presented in TPR-145)

        (2) Perform plant tissue collection for analysis.

b. During the second week:

   (1) Perform sampling of small mammal community structure, presence/absence, diversity/richness, and density/biomass sampling using the trap and release methodology (the sampling procedure is presented in Section B3.1.3)

   (2) Perform plant community structure, presence/absence, diversity/richness, and density/biomass sampling (the sampling procedure is presented in Section B3.1.1)

   (3) Perform bird community structure, presence/absence, diversity/richness, and density/biomass sampling (the sampling procedure is presented in Section B3.1.2).

c. During the third week:

   (1) Perform deer mouse tissue sampling to obtain effects and analytical data

   (2) Harvest small mammals for analytical concentration determination (the sampling procedure is presented in TPR-145)

   (3) Harvest small mammal samples for organ to body weight measurements, histopathology, and genetic samples (the sampling procedure is presented in Section B3.4).

6. Perform decontamination of sampling equipment, task site, and personnel, as necessary

7. Prepare samples for storage and shipment to the appropriate facilities:

   a. Genetic samples will be delivered to the geneticist

   b. Histopathology specimens will be shipped to the laboratory

   c. Preserved invertebrates will be sent to the laboratory

   d. Bioassay soils will be shipped to the laboratory for plant and earthworm toxicity bioassays

   e. Soil samples will be shipped to the laboratory for chemical and radiological analysis

   f. Plant and small mammal samples will be frozen and shipped to the laboratory for chemical and radiological analysis.

B2. ANALYTICAL SAMPLING PROCEDURES

B2.1 Biota Analytical Samples

Samples of vegetation, mammals, and soil will be collected for analysis of contaminant concentration.

B2.1.1 Vegetation Sampling Procedure for Analytical Sampling

Two types of vegetation, shrubs and grasses, representing the two most common functional plant types at the INEEL will be collected for chemical analysis. A review of dietary information for herbivorous and omnivorous INEEL wildlife species has resulted in consideration of the following individual plant species and/or types:

- Wyoming big sagebrush (*Artemisia tridentata*)
- Crested wheatgrass (*Agropyron cristatum*).

Sagebrush represents the shrub most commonly utilized by the INEEL's primary consumers, including the pronghorn, sage grouse, black-tailed jackrabbit, Nuttall's cottontail, and the pygmy rabbit. In addition, sagebrush is an important component in the diets of avian and mammalian omnivores and herbivorous insects. Wheatgrasses are most widely used and are significant components in the diets of jackrabbits, cottontails, birds, and small mammals. If crested wheatgrass is not available or the amount is not sufficient, other wheatgrasses will be substituted.

Terrestrial vegetation samples will be collected during the early part of the growing season in conjunction with small mammal population analysis and tissue collection. Grass and sagebrush will be sampled in late May or June.

A field reconnaissance will be used to assess species presence and abundance within each randomly selected 100 × 100 m (110 × 110 yd) grid. If wheatgrass or sagebrush is unavailable, the nearest grid that contains a sufficient amount of these species will be evaluated. A field reconnaissance of potential reference areas will also be completed to match the reference areas with the site areas to the greatest extent possible. Potential reference sampling areas with soil types similar to those onsite that have not been recently burned were identified in Figure 1-3. Final selection of the reference areas and sampling grid cells will be based on the presence of suitable species and access.

Each vegetation tissue sample will be a composite of material from at least five individual plants of the same species. Individual plants should be randomly selected within a 20-m (22-yd) radial plot in each corner and center of the 100 × 100 m (110 × 110 yd) grid. Such plants should also be located at least 1 to 3 m (1.1 to 3.3 yd) apart, depending on size. Atypical individuals (i.e., resemble less than 5% of the plants for the area) based on size or herbivory should not be included. An approximately equal amount of vegetation should be collected from each individual plant.

Clean disposable gloves should be worn. Plant samples should be clipped with pruning shears or grass shears, as appropriate. Plant material from each of the five radial plots should be combined into one plastic bag to make a composite sample. Sagebrush should be clipped on at least two sides and at two different heights to obtain a representative sample.

A minimum of 60 g of fresh biomass is required for radiological and metal analysis. If munitions analyses are required, an additional 30 g per analyte group is needed. Sample weight should be verified in the field to ensure an adequate quantity has been collected. Plant samples should be placed into a sealable plastic bag that has been placed into another sealable plastic bag. Sharp points on woody vegetation should be bent or broken off within the bag to avoid bag puncture. Bags should be labeled and the field data should be recorded in notebooks or on field data sheets. Samples should be placed in a cooler on ice until it is frozen or shipped to the laboratory. Field data will be recorded.

Grass samples should be collected by clipping above ground level (e.g., 1.3 to 5.1 cm [0.5 to 2 in.]) with grass shears. Clipping should be adjusted, as needed, to minimize sampling dead vegetation from previous years and to maximize sampling green vegetation from the current growing season. All material above the cutting height will be collected. Dead material should be removed from the sample by hand if unavoidably collected. Grass samples will include new growth of leaves, stems, and any inflorescences present on the plants. It is desirable to remove as much dead material as possible; however, this may be impractical and an estimate of the percentage of dead material should be noted.

Shrub samples should be collected using pruning shears. Collected material will include leaf and stem growth from the current season. Shrubs should be clipped at a height between 0.5 to 1.5 m (0.55 to 1.6 yd) on at least two sides. It is common to also collect woody material during this process. Stripping fresh leaves and stems from the woody material may be necessary. In the event that woody material is not removed, the sampler should make an estimate of the remaining amount.

Macrophytic aquatic plants should be collected along the margins of the wastewater ponds and the Big Lost River Sinks. One composite sample will be collected at each aquatic sample location. The aboveground portion of each plant should be cut and placed in a labeled heavy-duty plastic bag, then placed in a cooler with ice for transport to the analytical laboratory.

Modifications to these procedures can be made in the field as appropriate, based on the professional judgment of the FTL. All modifications will be documented in the field logbook or on the field sampling data sheets. Soil samples collocated with the plant tissue samples (i.e., from within the center of each 20-m [22-yd] radial plot in each corner and within the center of the 100 × 100 m [110 × 110 yd] grid) will also be collected.

B2.1.2 Mammal Sampling Procedure for Analytical Sampling

One small mammal species, the deer mouse *(Peromyscus maniculatus),* representing the major links between primary and secondary consumers and higher predators, will be collected for tissue analyses. The deer mouse is a primary prey item for both secondary and tertiary consumers. This species is commonly used to represent several important linkages in the food chain and is the primary choice because it is omnivorous, widespread, and relatively easy to collect. Collection of animal samples will be in accordance with applicable sections of TPR-145 and the information presented in the following paragraphs.

It will be necessary to collect several deer mice for each analysis to obtain the 60 g of tissue required. Deer mice will be composited to obtain the required tissue amounts. Compositing will not include segregation of small mammals by sex or age, but will be limited to the single species. Small mammal species, other than deer mice, will be weighed, photographed, and have other life history or details recorded in the field logbook and released.

The deer mouse samples will not be washed before homogenization. The intent of this sample preparation is to evaluate what a predator is most likely to consume. By incorporating all unwashed biotic tissue, all available contaminants in each sample will be assessed; however, not all of the analytes are necessarily bioavailable.

The same trapping design (see Section B3.1.3) used to evaluate small mammal population/community data will be used to collect deer mouse tissue samples for analytical assessment. Ten trapping locations or sample plots will be used in the two AOCs (TRA and Ordnance Area Group #1 [including the Experimental Field Station, Fire Station II Range Fire Burn Area, and NOAA Grid] and TRA) and the reference areas. A 100 × 100-m (110 × 110-yd) grid was placed over each of these areas, and plots were randomly chosen at each location. Figures 3-1 through 3-3 show the location of all ten sample plots at each of the three areas. Each sample plot will require a two- to three-week trapping period and will consist of one hundred traps placed along ten parallel transect lines (ten traps on each). Each of the transects will follow a roughly straight line 100 m long. An example of the transect design is shown in Figure B-1.

Traps will be left open four nights, closed three nights, and then reopened an additional four nights. Once an animal is trapped, a uniquely numbered ear tag is attached. The ear tag number correlates with the trap location, genus, species, collector's initials, and date recorded in a field logbook. The animal will be emptied into a plastic bag, and will be sexed, aged (adult/juvenile), weighed, and identified to its species if possible. A ruler should be used to measure the head-body length, ear from skull to tip, tail, and right hind foot to the nearest millimeter. The animal should then be returned for release to the location it was trapped. All information should be recorded on the data sheet.

Tissues will be collected for chemical and radiological analysis, genetics, and histopathology. On the last day of the population surveys, at least three deer mice in each grid will be retained as a single composite sample. Animals to be sacrificed for contaminant analysis will be dispatched in the field by asphyxiation with carbon dioxide. After dispatch, each carcass will be weighed and placed within a clean plastic bag. The amount of sample material in the composite sample will be determined by summing the weights of the individual specimens from each location. Processing should take place as soon as possible after checking traps to reduce potential degradation of the specimen. Samples will be placed on ice for transport to the processing center.

Portions of each animal's liver and kidney will be collected for histopathology. A ventral incision will be made with a clean scalpel blade. Small sections of the liver and kidney will be removed, weighed to the nearest 0.01 g, and placed in a 10% buffered Formalin. This solution is potentially carcinogenic and should be handled with caution that is detailed on the respective material safety data sheets (MSDS). The jar will be labeled with appropriate sample information (i.e., time, date, and sample identification number). Small sections of maternal and fetal tissue will be removed from female mice. The carcasses will be placed in a sealable plastic bag and placed inside another bag with the sample labeled. COC forms will be filled out.

Tissue samples for residue analysis should be frozen and shipped on blue ice to the laboratory. Dry ice can cause serious skin burns if handled incorrectly. Gloves should be worn when handling dry ice.

A single voucher specimen will be photographed, but will not be analyzed for contaminants. An experienced wildlife biologist will examine the voucher specimen to verify genus and species.

B2.2 Soil Analytical Characterization

Soil samples will be collected from the surface 0 to 5 cm (0 to 2 in.) and subsurface 5 to 61 cm (2 to 24 in.) or bedrock (i.e., limited to two sampling intervals), and will consist of composites from locations within the sampling plot designs that correspond to plants from which vegetation samples are collected.

Before sampling, it is important to calculate the total volume of sample material that each increment sample location will collect to ensure that the volume required for each analysis is available, to completely fill each sample container. The analysis-specific volumes are specified in Table 4-4. Sampling locations specified in Figures 1-3 and 3-1 through 3-3 will be identified and marked using surveying stakes, lath, or flags. The soil will be evaluated for contamination concentrations.

B2.2.1 Surface Soil Material

Composite surface material samples will be comprised of five increment subsamples collected from each of the corners and center point of a 100-m (110-yd) square. All or a portion of the increment samples will be mixed together to create a composite sample representative of average constituent concentrations within the area to be characterized. For a given composite sample, the volume of each increment sample must be the same, and must equal 1/n of the required composite sample volume, where n equals the number of increment samples making up the composite sample.

Surface material samples are collected as follows:

1. At each subsample location, an area approximately 61 cm (24 in.) in diameter is cleared of surface vegetation, nondecomposed plant litter, and debris.

2. A decontaminated stainless steel spoon or hand auger is used to collect surface material to a depth of five centimeters. A stainless steel pick may be used as needed to loosen the soil. To the extent possible, particles and debris that are gravel-size or larger are eliminated, based on visual observation.

3. The material is described visually and observations are recorded on the soil sample field data sheet.

4. The subsample is sieved through a No. 10 mesh and the fine fraction is placed into a decontaminated stainless steel mixing bowl, then thoroughly mixed.

5. For composite samples, Steps 1 through 4 are repeated at each subsample location adding each successive subsample to the mixing bowl.

6. The sample material is thoroughly mixed in the stainless steel bowl using a decontaminated stainless steel spoon. To homogenize, the sample is divided into quarters and mixed, then the four quarters are combined and the entire sample is mixed. The mixture is placed into the appropriate laboratory-supplied sample containers.

7. The containers are labeled and handled as required. Soil subsample location descriptions and collection information will be documented in the logbook per MCP-1194.

B2.2.2 Subsurface Soil Material

Subsurface material samples are collected as composite samples. Before sampling, it is important to calculate the total volume of collected sample material at each increment sample location to ensure the volume required for each analysis is available to completely fill each sample container. The analysis-specific volumes are specified in Table 4-4. Specified sampling locations will be identified and marked using surveying stakes, lath, or flags.

Composite surface material samples will be comprised of five increment subsamples collected from each of the corners and center point of a 100-m (110-yd) square. All, or a portion of, the increment samples are mixed together to create a composite sample representative of average constituent concentrations within the area to be characterized. For a given composite sample, the volume of each increment sample must be the same, and must equal 1/n of the required composite sample volume, where n equals the number of increment samples making up the composite sample.

Subsurface material samples are collected as follows:

1. At each sample location, an area approximately 61 cm (24 in.) in diameter is cleared of surface vegetation (nondecomposed plant litter) and debris.

2. A decontaminated (per TPR-6575) stainless steel spoon or hand auger is used to collect subsurface material from a depth of 5 to 61 cm (5 to 24 in.) below ground surface. A stainless steel pick may be used as needed to loosen the soil. To the extent possible, particles and debris that are gravel-size or larger are eliminated based on visual observation.

3. The material is visually described and observations are recorded on the soil sample field data sheet.

4. The increment sample is sieved through a No. 10 mesh and the fine fraction placed into a decontaminated stainless steel mixing bowl; then thoroughly mixed.

5. For composite samples, Steps 1 through 4 are repeated at each increment sample location for that composite sample, adding each successive increment sample to the mixing bowl.

6. The sample material is thoroughly mixed in the stainless steel bowl using a decontaminated stainless steel spoon. To homogenize, the sample is divided into four quarters and each quarter is mixed, then the four quarters are combined and the entire sample is mixed. The mixture is placed into the appropriate laboratory-supplied sample containers.

7. The containers are labeled and handled as required. Soil subsample location descriptions and collection information are documented in the logbook per MCP-1194.

The center of the sample grid location will be surveyed using a GPS unit.

B2.3 Soil Nutrient and Physical Characterization

Soil samples for soil nutrient and physical characterization will be collected at the same time and same locations as soil samples for contaminant analysis. Each composite sample will be collected as follows:

- Soil sampling sites will be collocated with chemical and radiological soil samples.

- Following collection of the chemical analysis samples (described above), appropriate amounts of homogenized soil will be placed into the shipping containers for analysis. Approximately 500 g will be placed into a sealable plastic bag for soil nutrient and physical characterization.

- The containers will be labeled and handled as specified by the FSP.

Modifications to these procedures may be made in the field, as appropriate, based on the professional judgment of the FTL. All modifications will be documented in the field logbook or on the field sampling data sheets.

B3. EFFECTS SAMPLING

B3.1 Population/Community Data

Ecological systems such as populations or communities are usually quite large and complex. These systems must be described and quantified to compare them with one another or assess changes in them. Several ecological variables can be measured, such as density, frequency, coverage, and biomass, to describe populations and communities. These measurements are used to characterize aspects of populations and communities such as presence/absence, population density, population distribution, species diversity, and productivity (biomass).

B3.1.1 Vegetation

A number of sampling technique designs are available for sampling plant populations and communities, such as a census, quadrant, transects, and line-intercept. The two types of vegetation surveys that will be used to characterize the plant populations during the 2003 sampling events at Ordnance Group #1, TRA, and the reference areas are the Daubenmire method and the line-intercept method. Both methods are suitable for estimating the cover for small shrubs, rhizomatous grasses, and bunchgrasses.

B3.1.1.1 Daubenmire Method. The Daubenmire method begins with the establishment of transect lines 30.5 m (100 ft) in length, randomly placed at each location. If possible, transects will be established at least 100 m (300 ft) from ecotones, roads, and other anthropogenic influences. GPS positions will be recorded and logged for the start and end points on each transect. Each transect line will have ten quadrat locations (or sample plots) spaced 3 m (10 ft) apart. A 1 × 3 m (1.1 × 3.3 yd) quadrat will be used to estimate percent ground cover. As the quadrat frame is placed along the tape at the specified intervals, the canopy coverage of each plant species is estimated. In addition, the data is recorded by quadrat, by species, and by cover class. Canopy coverage estimates can be made for both perennial and annual plant species.

1. The quadrat frame is observed directly from above and the cover class for all individuals of a plant species in the quadrat is estimated as a unit. All other kinds of plants are ignored as each plant species is considered separately.

2. A line drawn about the leaf tips of the undisturbed canopies (ignoring inflorescence) is imagined and these polygonal images are projected onto the ground. This projection is considered “canopy coverage.” The classes the canopy coverage of the species falls into can be determined (see Table B-1).

3. Canopies extending over the quadrat are estimated even if the plants are not rooted in the quadrat.

4. The data are collected during a period of maximum growth for key species.

5. For tiny annuals, it is helpful to estimate the number of individuals that would be required to fill 5% of the frame. A quick estimate of individuals in each frame will provide an estimate as to whether the aggregate coverage falls in Class I or II, etc.

6. Overlapping canopy cover is included in the cover estimates by species; therefore, total cover may exceed 100%. Total cover may not reflect actual ground cover.

Table B-1. Plant cover classes.

Coverage Class	Range of Coverage (%)	Midpoint of Range (%)
1	0 to 5	2.5
2	6 to 25	15.0
3	26 to 50	37.5
4	51 to 75	62.5
5	76 to 95	85.0
6	95 to 100	97.5

While using this method, it is important to keep track of the growth form of each species so that comparisons of grass vs. forb vs. shrub can be made. Also, if it is present, an estimation of the cover of bare ground and rocks will provide additional characterization data. While conducting this survey, it is important to remember to record total cover for each quadrat because this may differ from the sum of the cover values for individual species (due to plant canopy overlap). The surveyor should have a cover category for each quadrat among all identifiable species, mosses (if any), bare ground, rocks, and total cover.

Once the surveys are complete, the species cover can be estimated by multiplying the number of times a class is recorded by the midpoint of that cover class, adding the results for each class, and calculating an average by dividing by the total number of quadrats sampled. Data are usually collected from many quadrats located along a transect, so that the transect is the sample unit. Therefore, data must be collected from several transects to determine the sample's precision for statistical analysis of cover data.

This method recognizes the difficulty in accurately assigning an exact percent cover value to each quadrat, since even the highly experienced worker is unlikely to visually estimate closer than about 5% cover. Assigning broad cover classes provides an equally accurate result as long as the data follows a normal distribution around the midpoint within each class. The narrower upper and lower classes of the Daubenmire scale protect against skewed data in extremely sparse or dense vegetation.

Ranking data into broad classes is also a relatively rapid procedure, since observers are not required to spend as much time contemplating quadrat cover to the nearest percent. In fact, rapid evaluation of each quadrat is the key to success with this approach, since a large sample is less sensitive to the occasional incorrect ranking.

B3.1.1.2 Line-Intercept Method. The second method, line-intercept, uses a measuring tape (or marked string) stretched between two stakes or points (a transect line). The tape is pulled taunt and is anchored at both ends. The intercept distance is recorded for each plant/species that intercepts the line. Shrub cover is determined by tallying the measurements at which the line passes over or under the edges of individual plants (USFWS 1981). Surveyors move along the line and project the plant canopies vertically to the tape. The surveyors also record the length of the line segment intercepted by the plant and the type of plant involved. The vertical projection extends from the ground to infinity. As a result, it should be ensured that shrub cover intercepting above and below the line is recorded. Generally, small gaps between shrub foliage/branches (user defined) are ignored and included in shrub intercept measurements.

If different plant species overlap, each is measured separately; however, cover projections are not doubled (this is done to document shrub species diversity). If desired, shrub intercept can be recorded within different height strata (i.e., low, medium, tall, etc.).

Cover is calculated by adding all intercept distances and expressing this total as a proportion of tape length. Each transect is regarded as one sample unit, so multiple transects must be measured to estimate sample variance and conduct statistical analyses of cover data. For example, 10 ft of cover/ 100 ft × (100) = 10% shrub cover (Figure B-2). Percent cover for the entire transect is determined by adding the percent cover of each 100 ft sample unit, then dividing the sum by the transect length (i.e., 120 ft of cover/1000 × [100] = 12% cover).

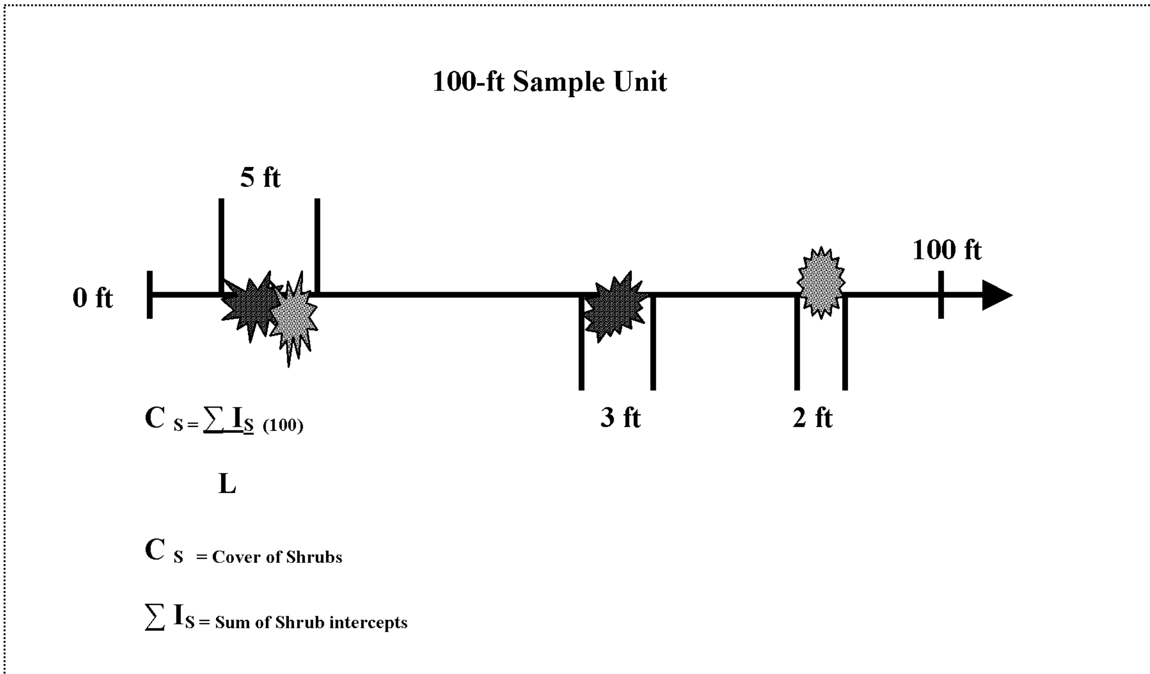

Figure B-2. Shrub cover intercept example.

The line-intercept method is easy to learn, simple to use, and provides an accurate estimate of cover. In fact, line-intercept sampling is often used as the standard comparison when testing other methods to determine cover. Its primary drawback is that sampling can be time consuming, particularly in dense vegetation or when intercept distances are difficult to define because of many gaps or irregular edges within the canopy. Therefore, the line-intercept technique is best suited for vegetation characterized by discrete plants, such as bunchgrasses or compact shrubs.

B3.1.2 Birds

The Breeding Bird Survey is a roadside survey of avifauna designed to monitor abundance and distribution of birds in the United States and southern Canada. Routes have been established and used at the INEEL (Belthoff and Ellsworth 1999). The methodology used in this FSP will be adapted to the sampling presented in Belthoff and Ellsworth (1999). Additional evaluation of bird population/community data will be incorporated as a selected study in an area of known contamination.

B3.1.3 Mammals

Small mammals will be evaluated by using live trapping methods. The ten sample plots established for biota and soil analytical sampling will be used to assess the small mammal population/community data in the two AOCs and the reference areas. Figures 1-3 and 3-1 through 3-3 show the location of all sample plots at all three areas. Each sample plot will require a two- to three-week trapping period, and will consist of one hundred traps placed along ten transect lines (ten traps on each) in a line grid formation. Each of the transects will approximately follow a 100-m long straight line. An example of the transect design is shown in Figure B-1.

Traps will be left open four nights, closed three nights, and then reopened an additional four nights. There will be 800 nights of trapping within each 100-m sample plot during the 2003 trapping season. Statistical evaluation of the initial data may be used to alter this design.

Once an animal is trapped, a unique numbered ear tag is attached. The ear tag correlates with the trap location, genus, species, collector's initials, and date recorded in a field logbook. The animal will be emptied into a plastic bag, and will be sexed, aged (adult/juvenile), weighed, and identified to its species, if possible. A ruler should be used to measure the head-body length, ear from skull to tip, tail, and right hind foot to the nearest millimeter (mm). The animal should then be released to the original location from where it was trapped. All information should be recorded on the data sheet.

The mark-and-recapture method will be used in estimating population densities. This method involves several steps:

1. Trapping and marking some individuals of a population

2. Releasing the known number of marked individuals back into the population from which they were captured

3. Trapping some individuals of the population after the marked individuals have had a chance to redistribute themselves into the population

4. Estimating the total population size by a series of computations that are based on the ratio of marked to unmarked individuals in the recapture attempt.

Generally speaking, if the population is large, the marked individuals will become diluted within it and only a few would be expected to appear in the second sample. If assumptions about the sampling and animals' distribution are correct, then the proportion of marked individuals in the second sample is the same as the entire population.

Like all estimation procedures, a number of assumptions must be met to validly use this method:

- The two samples taken from the population must be random samples (i.e., all individuals in the population have an equal and independent chance of being captured during the time of sampling)

- There is no change in the ratio of marked to unmarked animals, meaning that from initial capture to recapture there must be no significant addition of unmarked animals to the population through births or immigration

- The population losses from mortality and emigration must remove the same proportion of marked and unmarked individuals

- The marking of individuals does not affect their mortality

- Individuals do not lose marks.

The Peterson-Lincoln Index, the simplest method for determining the population size, will be used. The total population may be estimated as follows:

- Assume the total estimated population size contains N individuals
- Sample M individuals from this population, mark these animals, and return them to the population
- Sample a second set of n individuals from the population; this sample contains recaptured animals (i.e., individuals captured and marked in the first sampling)
- Estimate the population size, N, by the equation:

$$N = Mn / R \tag{1}$$

Equation 1 may overestimate the population size (i.e., it is biased) when samples are relatively small. Nc is a nearly unbiased estimate of population size if the number of recaptured animals, R, is at least eight. This bias can be reduced by computing:

$$Nc = \frac{(M+1)(n+1)-1}{R+1} \tag{2}$$

The approximate variance, s^2, of this estimate is:

$$s^2 = \frac{(M+1)(n+1)(M-R)(n-R)}{(R+1)^2(R+2)} \tag{3}$$

With the standard deviation, s, 95% and 99% confidence limits on the population estimate are given by:

$$N(or\,NC) + 1.96(s)(95\%\ \mathit{confidence\ limits}) \tag{4}$$

and

$$N(or\ NC) + 2.58(s)(99\%\ \mathit{confidence\ limits}) \tag{5}$$

B3.1.4 Reptiles

Collection of small mammals will provide an indication of possible exposure of reptiles to contamination in the soil. Population information will be collected for these receptors that is consistent with the direction in the OU 10-04 ROD. Collection will occur during future field seasons under the LTEM Plan and will use university experts in the design of the project.

B3.2 Earthworm and Plant Bioassay Soil Samples

Bioassay soil samples will be collected at the same time and same locations as soil samples. Each composite sample will be collected as follows:

- Soil sampling sites will be collocated with chemical and radiological soil samples

- Following the collection of the chemical analysis samples (described above), appropriate amounts of homogenized soil will be placed into the shipping containers for the bioassays

- Containers will be labeled with the date, location, and other appropriate information and shipped on ice to the bioassay laboratory for processing.

Modifications to these procedures may be made in the field as appropriate based on the professional judgment of the FTL. All modifications will be documented in the field logbook or on the field sampling data sheets.

B3.3 Soil Invertebrate Community Survey Soil Samples

Soil samples for soil on invertebrate community structure will be collected at the same time and same locations as soil samples for analysis. Each composite sample will be collected as follows:

1. Soil sampling sites will be collocated with the chemical and radiological soil samples.

2. Following collection of the samples for chemical analysis, appropriate amounts of homogenized soil will be placed into shipping containers for the Berlese Funnel extraction. Approximately 500 g of soil will be placed into a sealable plastic bag for Berlese Funnel extraction to conduct soil fauna community analysis.

3. Large invertebrates will be removed from the soil sample.

4. The soil sample will be placed in a funnel under a 40-watt light bulb. The lamp above the soil creates a warm, dry, and well illuminated condition at the top of the funnel, encouraging cool-, shade-, and moisture-loving invertebrates to move down the funnel into a collecting bottle containing a preservative (i.e., 80% ethanol).

5. The Berlese Funnel technique gives a biased sample of soil fauna because it captures species that are mobile and do not desiccate easily. Therefore, it may miss many insect larvae and other soft-bodied invertebrates.

6. The containers will be handled and labeled with the date, sample location, and other information as appropriate.

Modifications to these procedures may be made in the field as appropriate, based on the professional judgment of the FTL. All modifications will be documented in the field logbook or on the field sampling data sheets.

B3.4 Histopathology and Body and Organ Weight

Small mammal tissues will be collected for chemical and radiological analysis, genetics, and histopathology. On the last day of small mammal population surveys (see Section B3.1.3), at least three deer mice in each sampling plot will be retained as a single composite sample. Deer mice will be taken to the laboratory. Immediately before processing, live animals should be killed by cervical dislocation or asphyxiation with carbon dioxide gas. Animals should be removed from traps one at a time, so that specimens are not misidentified. Processing should take place after trap checks as soon as possible to reduce potential degradation of the specimen. The deer mice will be weighed to the nearest 0.1 g.

A ventral incision will be made with a clean scalpel blade. Small sections of liver and kidney will be removed for histopathology and weighed to the nearest 0.01 g, then placed in 10% buffered Formalin. This solution is potentially carcinogenic and should be handled with caution as detailed on the MSDS. The jar will be labeled with appropriate sample information (time, date, sample identification number, and ear tag number).

Small sections of maternal and fetal tissue will be removed from female mice for genetics analysis. The three carcasses forming the single composite sample will be placed in a sealable plastic bag, placed inside another bag, and then labeled for contaminant analysis. COC forms will be filled out.

The removal of the kidney and liver may reduce apparent concentrations slightly. Estimated losses in concentration are as follows:

$$\text{mg/kg WB} * \text{kg WB} + \text{mg/kg L} * \text{kg L} + \text{mg/kg k} * \text{kg k} \tag{6}$$

where

mg/kg WB	=	concentration in whole body
mg/kg L	=	concentration in liver (estimated)
mg/kg k	=	concentration in kidney (estimated)

A bioaccumulation factor from the literature will be used to estimate the fraction lost to histopathology. Although the bioaccumulation factor introduces uncertainty into the assessment, the liver and kidney tend to concentrate metals and may exhibit cellular changes for evaluation of effects from exposure. If effects are determined to be present, a selected study will be performed to further characterize this problem or the sampling approach will be modified appropriately.

B4. AQUATIC ECOSYSTEM CHARACTERIZATION

Aquatic ecosystem sampling will be performed across the INEEL at AOCs during future sampling seasons as discussed in the LTEM Plan (INEEL 2003). This approach will allow optimization of sampling efforts and should reduce analysis costs.

B4.1 Sediment and Surface Water Analytical Sampling

Sediment and surface water samples will be obtained from the reference areas and from the waste ponds at TRA and will be used to predict health effects and exposure in selected collocated species and swallows.